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## Injuries and Deaths Due to Firearms in the Home

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### Abstract

**Objectives:** Determine the relative frequency with which guns in the home are used to injure or kill in self-defense, compared with the number of times these weapons are involved in an unintentional injury, suicide attempt, or criminal assault or homicide.

**Methods:** We reviewed the police, medical examiner, emergency medical service, emergency department, and hospital records of all fatal and nonfatal shootings in three U.S. cities: Memphis, Tennessee; Seattle, Washington; and Galveston, Texas.

**Results:** During the study interval (12 months in Memphis, 18 months in Seattle, and Galveston) 626 shootings occurred in or around a residence. This total included 54 unintentional shootings, 118 attempted or completed suicides, and 438 assaults/homicides. Thirteen shootings were legally justifiable or an act of self-defense, including three that involved law enforcement officers acting in the line of duty. For every time a gun in the home was used in a self-defense or legally justifiable shooting, there were four unintentional shootings, seven criminal assaults or homicides, and 11 attempted or completed suicides.

**Conclusions:** Guns kept in homes are more likely to be involved in a fatal or nonfatal accidental shooting, criminal assault, or suicide attempt than to be used to injure or kill in self-defense.

Key Words: Injury, Firearms, Epidemiology.

Forty percent of American homes contain one or more firearms. [1] People own guns for many reasons, including hunting, target shooting, and collecting. Guns are also owned, at least in part, for self-defense. [2,3] Fear of crime is widespread, and many consider keeping a gun in the home a reasonable precaution. [2-7] Handgun owners are more likely than owners of rifles or shotguns to cite "self-defense" as their most important reason for owning a gun. [2,6] People who keep guns for self-defense are more likely to keep at least one gun loaded and unlocked than people who keep guns for other purposes. [7]

The belief that keeping a gun provides protection from crime is widespread, but the wisdom of this strategy is far from clear. [8] The gun that is kept loaded and readily available for protection may also be reached by a curious child, an angry spouse, or a depressed teenager. [9-12] To more clearly define the overall balance of benefits and risks associated with keeping a gun in the home, we identified all fatal and nonfatal shootings that took place in homes in three U.S. cities. We were particularly interested in determining how often guns kept in the home were used to injure or kill an intruder, compared with the number of times they were involved in an unintentional shooting, a criminal assault, or a suicide attempt.

## PATIENTS AND METHODS

The data used in this analysis were drawn from a population-based study of fatal and nonfatal gunshot injuries in three U.S. cities: Memphis, Tennessee; Seattle, Washington; and Galveston, Texas. [13] Reports from police, medical examiners, and ambulance crews were linked with records from hospital emergency departments, trauma centers, and community hospitals to identify every gunshot injury that was severe enough to prompt the victim to seek emergency medical treatment. A detailed description of the methodology for case identification is published elsewhere. [13]

Every shooting that occurred in the home of the victim, the shooter, or a third party was included. Our definition of "home" included the immediate yard and driveway of single-unit dwellings. Detached structures, outbuildings, and more distant property were not considered part of the home. Common areas of multi-unit dwellings, such as hallways, lobbies, and parking lots, were excluded as well.

Investigating officers generally commented on whether the gun involved in the shooting was kept in the home or brought from another location. We recorded this information whenever it was documented. When the shooting was committed in self-defense or was considered to be legally justifiable, this information was recorded as well.

Cases were subdivided by manner of injury: unintentional, attempted or completed suicide, assault or homicide, and unknown/undetermined. Assaults were further subdivided into those that were considered "legally justifiable" or an act of self-defense, and those that were committed with criminal intent. We did not attempt to follow up cases to determine legal outcome.

Incidence rates for various types of shootings were calculated per 100,000 person-years of risk. Rate ratios and 95% confidence intervals for unintentional shootings, criminal assaults/homicides, and attempted or completed suicides involving a gun kept in the home were based on the rate of legally justified and self-defense shootings involving a gun kept in the home.

## RESULTS

A total of 1,915 cases of gunshot injury were identified during the 18-month study interval (November 16, 1992, to May 15, 1994). One third (n = 626) occurred in or near a residence. This subset included 54 accidental shootings, 118 attempted or completed suicides, and 438 assaults or homicides. Sixteen shootings took place under unclear or conflicting circumstances.

The type of firearm involved was noted in 525 cases (84%). In 456 of these (87%), it was a handgun. Two-thirds of residential shootings (n = 430) took place at the home of the victim, and one-fourth of the shootings (n = 157) took place at the home of a third party. Only 6% of cases (n = 39) took place at the home of a shooter other than the victim.

### Unintentional Deaths and Injuries

Nine percent of residential shootings (n = 54) were unintentional. Forty-eight of these (89%) took place in the home of the victim. The origin of the firearm was documented in 69% of cases. In 80% of these incidents (n = 30), investigators noted that the gun involved was kept in the home (Table 1).

Circumstance	No. of cases	%	Rate*	Rate Ratio	95% Confidence Interval
Legally justifiable/self-defense shootings					
Circumstance					
Police action	3	(0.5)	0.2		
Citizen action	10	(1.6)	0.7		
Gun involved kept in home	7	(1.1)	0.5	Referent	
Subtotal	13	(2.1)	0.9		
Unintentional shootings					
Circumstance					
Self-inflicted	46	(7.3)	3.1		
Other	8	(1.3)	0.5		
Gun involved kept in home	30	(4.8)	2.0	4.3	1.8–11.6
Subtotal	54	(8.6)	3.7		
Criminal assaults and homicides					
Shooter					
Spouse/family/intimate	79	(12.6)	5.4		
Nonintimate acquaintance	169	(27.0)	11.5		
Rival	10	(1.6)	0.7		
Stranger/unidentified	167	(26.7)	11.3		
Gun involved kept in home	49	(7.8)	3.3	7.0	3.2–18.3
Subtotal	425	(67.9)	28.8		
Attempted and completed suicides					
Gun involved kept in home	79	(12.6)	5.4	11.3	5.2–29.0
Subtotal	118	(18.8)	8.0		
Unknown/unidentified circumstances					
Subtotal	16	(2.6)	1.1		
Total	626	(100)	42.5		

\* Incidence rates are expressed as the number of cases per 100,000 person-years. Rate ratios are referent to the rate of legally justifiable or self-defense shootings that involved a gun kept in the home. All P values < .0001.

Table 1. Firearm-related injuries and deaths in the home: Memphis, Tennessee; Seattle, Washington; and Galveston, Texas

Eighty-five percent of victims (n = 46) accidentally shot themselves. The rest were unintentionally shot by an acquaintance, spouse, boyfriend, sibling, or relative (Table 1). Fifteen victims (28%) were less than 18 years of age. Four were less than 12 years old. Two of the 54 victims (3.7%) died.

### Suicides and Suicide Attempts

Nineteen percent of residential shootings (n = 118) were attempted or completed suicides. Of these shootings, 105 (89%) took place in the home of the victim. The origin of the firearm was documented in 83% of cases. In 81% of these (n = 79), investigators established that the gun involved was kept in the home (Table 1). Fifteen victims (13%) were less than 18 years of age. Eighty-nine percent of suicide attempts (n = 105) resulted in death.

### Homicides and Assaults

Seventy percent of residential shootings (n = 438) were assaults. Ninety-seven percent of these (n = 425) involved criminal intent. Sixty-one percent of victims (n = 266) were shot in their own home. The rest were shot in the home of the shooter (8%) or a third party (31%).

Police noted that the gun was brought to scene in 67% of assaults (n = 295). In 12% of cases (n = 49), the gun was kept in the home where the shooting occurred. The origin of the weapon was not noted in the remaining 21% of cases.

Almost 40% of victims (n = 167) were shot by a stranger or an unidentified assailant, generally during the commission of a crime such as robbery. Ten victims (2.3%) were shot by a romantic rival or a member of a gang. Forty percent of victims (n = 169) were shot by a nonintimate acquaintance, and 19% (n = 79) were shot by their spouse, intimate acquaintance, parent, sibling, relative, or roommate, generally during an argument or altercation (Table 1). One of every five firearm assault victims died.

### Unknown or Conflicting Circumstances

Incident circumstances were unclear or conflicting in 16 cases (3% of all residential shootings). It is likely that most were due to assault. None were fatal.

### Legally Justifiable/Self-Defense Shootings

Thirteen assaults (3% of all assaults) were considered "legally justifiable" or an act of self-defense. Three involved law enforcement officers acting in the line of duty. Ten were committed by private citizens ([Table 1](#)).

Five citizens shot a stranger or an unidentified assailant. Three women shot former boyfriends in self-defense; one man shot a nonintimate acquaintance who was attempting to break into his home. Another shot his brother in self-defense during an altercation.

Six of the legally justifiable/self-defense shootings (including all three by law enforcement) took place at or inside the home of the victim. Five took place at or inside the home of the shooter. Two took place in the home of a third party. Nine (69%) were fatal.

The number of unintentional shootings, criminal assaults, and suicide attempts involving a gun kept in the home exceeded the number of self-defense and legally justifiable shootings by a ratio of 22 to 1. Guns kept in homes were four times more likely to be involved in an unintentional shooting, seven times more likely to be used in a criminal assault or homicide, and 11 times more likely to be used in an attempted or completed suicide than to be used to injure or kill in self-defense ([Table 1](#)).

## DISCUSSION

Each year, firearms cause approximately 38,000 deaths and 99,000 nonfatal injuries in the United States. [\[14-16\]](#) Nearly half of all fatal shootings, and a large majority of nonfatal gunshot wounds, are the result of interpersonal violence. [\[15,16\]](#) In urban areas, many shootings occur in or around homes. [\[13\]](#)

Although many Americans keep one or more guns in their home for protection, evidence suggests that this strategy does more harm than good. Kellermann and Reay identified all firearm-related fatalities that occurred in King County, Washington between 1978 and 1983. More than half ( $n = 398$ ) occurred in the home where the gun involved was kept. Two involved intruders shot during attempted entry. For every case of self-defense homicide involving a firearm kept in the home, there were 1.3 unintentional shooting deaths, 4.6 criminal homicides, and 37 firearm suicides. [\[8\]](#)

Lee and colleagues studied both fatal and nonfatal shootings in Galveston, Texas, over a 3-year period. Two occurred during a residential robbery or burglary. In one case, a homeowner was shot and killed by a burglar. In the other, the homeowner shot the burglar, leading to his arrest. During the same time interval, guns in the home were involved in the death or injury of more than 100 homeowners, family members, friends, or acquaintances. [\[17\]](#)

The data used in our analysis were collected in three cities with widely differing characteristics. [\[13\]](#) Police, emergency medical service, and hospital records were linked to enhance case identification and generate a complete picture of each event. Explicit documentation was required to establish that the gun involved was kept in the home. All of the legally justifiable and self-defense shootings contained sufficient information to determine the origin of the weapon. A comparable level of documentation was not always available in cases of accidental shooting, criminal assault, or attempted suicide. If the gun involved in the shooting was not specifically noted to have been kept in the home, we assumed that it was not. As a result, our estimates are conservative.

Although we went to great lengths to collect complete information on each case, this was not always possible. Some victims were too injured or impaired to recall specific details of their injury event. Others were unwilling to report specific details of their shooting. To maximize detection of cases and minimize the potential for misreporting, we attempted to link each hospital and/or emergency department record with its corresponding police report. This was accomplished in a large majority of cases. [\[13\]](#)

In the three cities we studied, health care personnel are required to report gunshot injuries to the authorities. [18-20] Unfortunately, this reporting did not always occur. In busy emergency departments, a case can be overlooked if personnel assume that someone else has already called the police. Patients who wish to avoid detection may dissuade health care workers from reporting a case by claiming that police documented the facts on the scene. [21]

Counting cases of fatal and nonfatal injury does not measure all of the potential benefits and risks of keeping a gun in the home. A gun can be used to scare away an intruder without a shot being fired. [3] Simply keeping a gun in the home may deter some criminals who fear confronting an armed homeowner. [2]

Conversely, keeping a gun in the home may increase the risk of burglary if intruders seek guns as part of the loot. [22] Two-thirds of the estimated 341,000 episodes of firearms theft each year occur during household burglaries [23] Ready access to a firearm may encourage some homeowners to confront an intruder or to behave in other ways that increase their risk of injury or homicide. [24] A gun in the home can be used to ward off an attack, but it can also be used to terrify an abused partner, frighten a neighbor, or threaten suicide. None of these incidents are included in wound or body counts. [13]

Surveys have been used to estimate the frequency of self-defense gun use, but they are prone to methodologic problems, including telescoping, recall bias, and misreporting. [22,25,26] What one person considers a legitimate act of self-defense (e.g., brandishing a gun at the front door) may be perceived as a criminal act by another. Researchers have demonstrated that using survey data to estimate the frequency of rare events can produce highly inflated results. [25,26]

All of these problems are evident in a widely quoted study of defensive gun use by Kleck and Gertz. [27] By extrapolating a relatively small number of positive responses to a public opinion poll, they estimated that guns are used in self-defense 2.5 million times per year. This Figure conflicts with the much larger and more authoritative National Crime Victimization Survey, which suggests that guns are used to protect people or property approximately 82,500 times per year. [23] Cook used pooled National Crime Victimization Survey data collected between 1979 and 1987 to calculate that 3.1% of the estimated 1 million annual residential burglaries during this time frame were resisted with a gun. [22] McDowall and Wiersema analyzed pooled National Crime Victimization Survey data for the years 1987-1990 and calculated that fewer than 1% of victims of violent crime used a gun to defend themselves. [28]

One way to assess the validity of these data is to determine how often defensive gun use is reported to the police. Researchers in Atlanta, Georgia, audited police records over a 3-month interval to identify every reported case of unauthorized entry into an occupied, single-family dwelling. A total of 197 cases were documented. Three victims (1.5% of the total) reported that they used a gun to defend themselves. Six others (3%) reported that they lost their gun to the intruder(s). [29]

Properly controlled studies are needed to determine the strength and direction of any association between gun ownership and adverse outcomes such as death, nonfatal injury, or victimization by crime. Every case-control study conducted to date has identified a link between gun ownership and an increased risk of suicide [11,12,30-33] or homicide. [24,33]

## CONCLUSION

Although guns in the home are occasionally used to injure or kill in self-defense, the odds that a gun will be used in this manner are substantially outweighed by the odds that it will be involved in an unintentional shooting, a criminal assault, or a suicide attempt. This finding contradicts advertisements that claim firearms provide effective home protection. [34,35] Physicians and surgeons should provide their patients with objective information about the benefits and risks of keeping a gun for protection. [36] They should also promote safe and secure storage of firearms [37,38] as well as strategies to prevent firearm violence. [39]

## Acknowledgments

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Characteristic	No. of cases	%	OR*	95% CI	95% CI (lower bound)
<b>Legal/constitutional systems</b>					
Constitutional	8	20.0	3.1		
Other	32	79.9	1.0		
<b>Car ownership</b>					
Car ownership	7	17.5	3.4		
No car ownership	33	82.5	1.0		
<b>Occupational groupings</b>					
Occupational	36	87.5	1.1		
Other	4	9.8	1.9		
Car ownership	28	68.8	2.2		
No car ownership	34	82.8	3.7		
<b>Common assault and firearms</b>					
Firearm	76	17.9	3.1		
No firearm	358	82.0	1.0		
Firearm	10	2.4	0.7		
No firearm	307	71.2	1.3		
Firearm	40	9.3	1.0		
No firearm	270	62.0	1.0		
<b>Armed and hospitalized victims</b>					
Armed	38	8.8	6.1		
No armed	318	73.0	1.0		
<b>Unarmed and hospitalized victims</b>					
Armed	38	8.8	1.1		
No armed	318	73.0	1.0		

Table 1

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